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(56) Documents cited  
GB 2229170 A GB 2148859 A EP 0475805 A1  
WO 91/18799 A US 4682530 A US 4373641 A

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## (54) A container neck and closure assembly

(57) An assembly comprises a container neck 10 with threads having four starts and a closure 12 securable by rotation through about 90°. Projections 25 on the neck cooperate with ribs 36 on the closure to define a fully closed position in which a reliable seal is formed and accidental opening of the closure is prevented. A tapered inner surface 30 of the closure makes a seal against a tapered sealing surface 22 of the neck, the engagement between the surfaces 22, 30 preventing the closure from being overtightened. A further stop projection (48, Figure 2) may also prevent overtightening. Each projection 25 has a ramp surface 25a and the closure skirt deforms as the ribs 36 ride over the surfaces 25a before audibly clicking behind radial abutment surfaces 25b. The closure may have a tamper evident ring 34 which is retained on the neck (in a dropped down position) when the closure is removed. The open end of the neck may have a reduced circumference portion 24 and include a peelable web 26, an edge 28 projecting radially proud of the reduced circumference portion. The closure may be a child-resistant two part closure with radial inner and outer parts 14, 16 and an upstanding handle 46 may be provided.

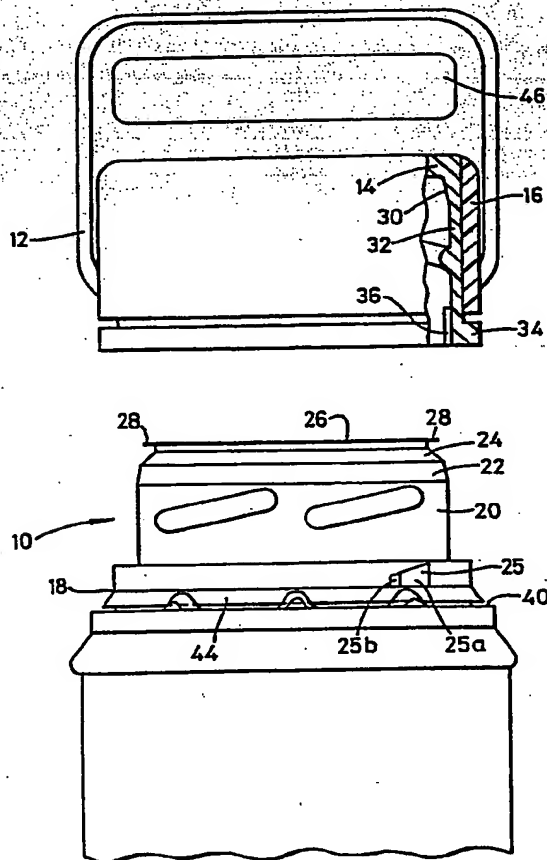


FIG. 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.

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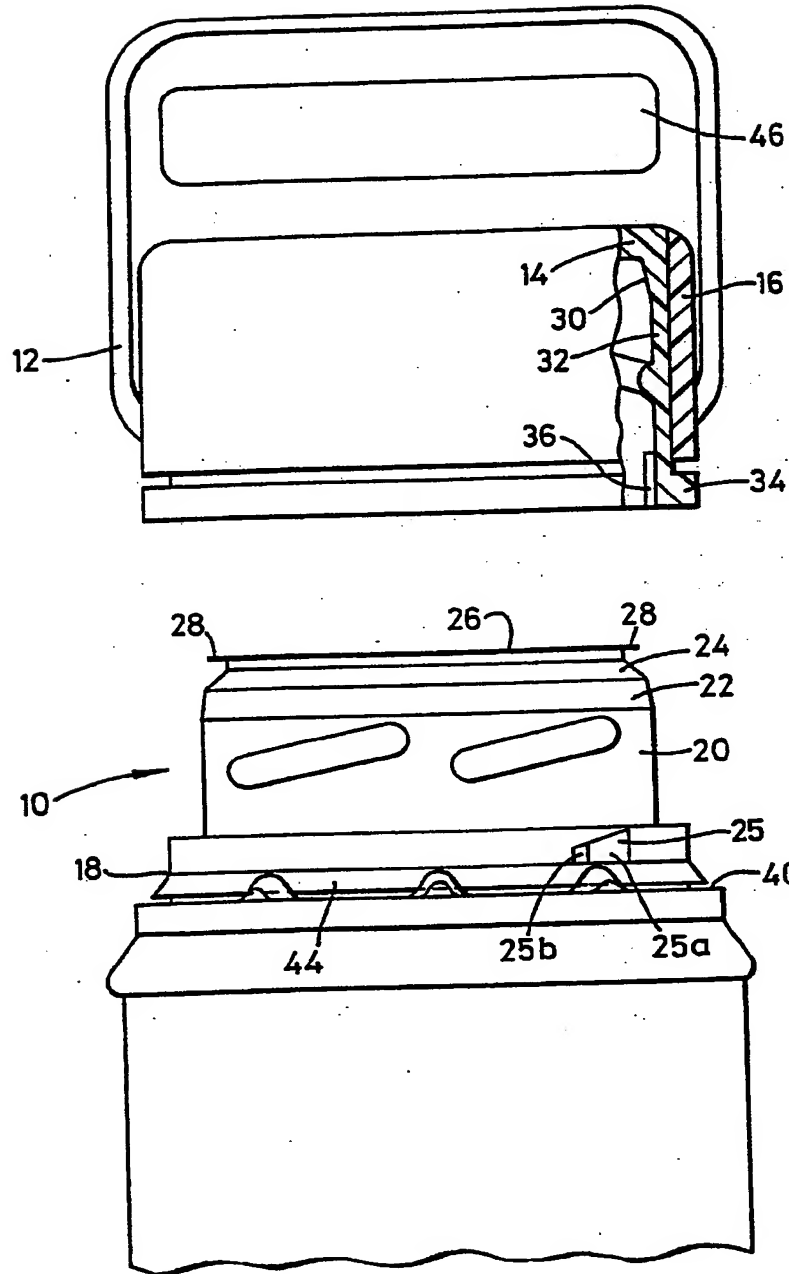


FIG. 1

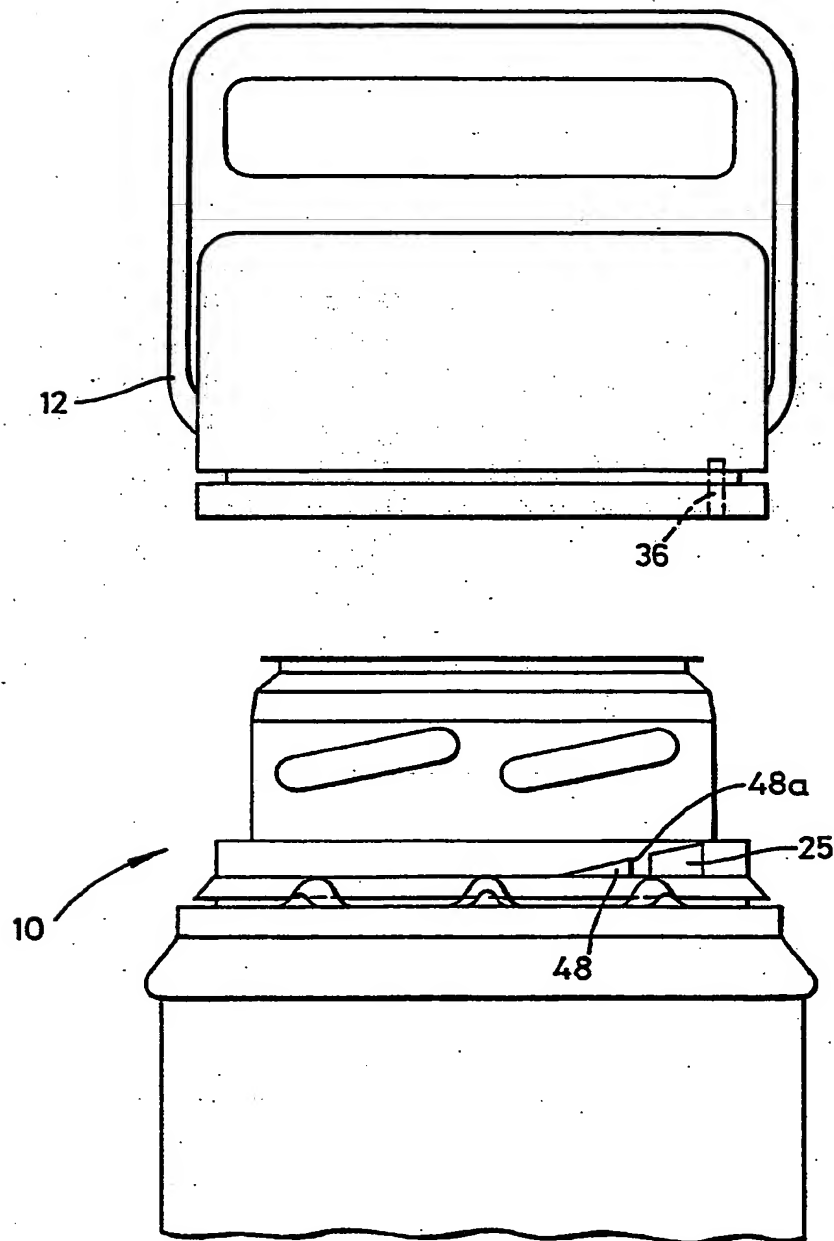


FIG. 2

A CONTAINER NECK AND A CLOSURE THEREFOR

This invention relates to a container neck and to a closure for the neck. The invention is particularly, but not exclusively, directed to container necks and closures which are adapted to fit one another by having complementary screw threads. The invention is also particularly, but not exclusively, directed to containers which are designed to be sealed against the ingress of air, or liquid, or other contaminants, when the closure is fitted to the container neck.

A design of such a container is described in our UK application No. 9114871.8, the disclosure of which is incorporated herein by way of reference. The present application will also refer to the following patent applications, the disclosures of which are also incorporated herein by way of reference: UK applications Nos. 9120264.8 and 9122097.0; and International application No. PCT/GB91/00850.

A problem with conventional containers is that, often, a user will overtighten a closure on the container neck to ensure that a reliable seal is formed. The closure is then difficult to remove later because it is tight. If the closure is considerably overtightened, it may be extremely difficult to remove later, and it may also cause damage by permanently deforming parts of the closure and/or the container neck.

The problem of overtightening can also occur when the closure is a child-resistant closure. Such closures rely on the closure being secured to the container neck with a predetermined degree of tightness, such that a predetermined torque must be applied to unscrew the closure. If the closure is not secured with the necessary degree of tightness, the child-resistant feature will not operate effectively. Therefore, child-resistant closures are often overtightened to ensure that the closure will operate effectively, since otherwise they closure might fail to be child-resistant.

In various aspects the invention seeks to overcome these and/or other problems.

In a first aspect, the invention provides an assembly comprising a container neck and a closure therefor, 5 complementary threads on the container neck and the closure, means for positively defining a closed position of the closure on the container neck, retaining means for holding the closure, in use, in the closed position, the closure being movable between the closed position and an opened 10 position by relative rotation through approximately 90 degrees or less, and the assembly further comprising means for preventing the closure from being overtightened substantially beyond the closed position.

Preferably, the means for defining the closed position 15 produces a detectable "click" effect when the closed position is reached.

Preferably, the retaining means retains the closure, in use, in the closed position until a predetermined release torque is applied between the closure and the container 20 neck.

Such an arrangement is particularly suitable for use with a child-resistant closure such as that described in our UK patent application Nos. 9120264.8 and/or 9122097.0. The positively defined closed position indicates to a user that 25 no further tightening of the child-resistant closure is required, and the retaining means holds the closure in position until a predetermined amount of torque is applied between the container neck and the closure. For example, should a child attempt to open the closure, the amount of 30 torque that will be transmitted through the child-resistant closure will be less than the torque required to overcome the retaining means. When an adult attempts to open the closure, the adult will press the closure downwardly to engage the torque transmitting castellations in the child-resistant closure to enable adequate torque to be applied to 35 overcome the retaining means. The invention thereby ensures that the child-resistant feature will operate effectively.

The means for defining the closed position and the

retaining means may be embodied together as projections on the container neck and on the closure, the projections engaging as the closed position is reached. At least one of the projections may preferably be profiled to have a  
 5 circumferential ramp surface over which the other projection can ride easily as the closure nears the closed position, and a radially inwardly extending abutment surface against which the other projection bears when the closure is to be unscrewed from the closed position.

10 Preferably, the closure and the container neck have complementary sealing surfaces for forming a seal when the closure is in its closed position on the container neck. The complementary sealing surfaces may advantageously form the means for preventing the closure from being  
 15 overtightened substantially beyond the closed position. The sealing surfaces preferably extend in a direction at least a component of which is lateral, or radial. With this arrangement, if the closure is overtightened beyond its closed position, the sealing surfaces will bear against each  
 20 other more strongly, to thereby oppose further tightening of the closure.

An alternative arrangement is to provide stop projections on the container neck at positions circumferentially beyond the projections which define the  
 25 closed position. Preferably, the stop projections have a radial abutment surface adapted to engage the projections on the closure.

In a closely related aspect, the invention also provides an assembly comprising a container neck and a closure  
 30 therefor, complementary threads on the container neck and the closure, means for positively defining a closed position of the closure on the container neck, the closure having a skirt portion an inner surface of which is adapted to seal, in use, against an outer surface of the container neck when  
 35 the closure is screwed into the closed position, the said surfaces forming the seal co-operating to oppose overtightening of the closure substantially beyond the closed position.

Preferably, the assembly also comprises means for retaining the closure in the closed position until a predetermined release torque is applied between the closure and the container neck. The means defining the closed position and the retaining means may be embodied as  
5 projections, as described above.

In a further closely related aspect, the invention provides an assembly comprising a container neck and a closure therefor, complementary threads on the container  
10 neck and the closure, means for positively defining a closed position of the closure on the container neck, complementary sealing surfaces on the container neck and the closure for forming a seal when the closure is screwed into the closed position, the sealing surfaces being inclined relative to  
15 the longitudinal axis of the container neck whereby the sealing surfaces co-operate to oppose overtightening of the closure substantially beyond the closed position.

Preferably, the assembly also comprises means for retaining the closure in the closed position until a  
20 predetermined release torque is applied between the closure and the container neck. The means for defining the closed position and the retaining means may be embodied together as projections, as described above.

In a further aspect, the invention provides an assembly  
25 comprising a container neck and a closure therefor, complementary threads on the container neck and the closure, the closure having a skirt portion an inner surface of which is adapted to seal, in use, against an outer surface of the container neck, the assembly further comprising means for  
30 positively defining a closed position of the closure on the container neck at which position the skirt portion is adequately seated on the container neck to obtain a seal, whereby, overtightening of the closure on the container neck can be avoided.

35 Preferably, the assembly also comprises means for retaining the closure, in use, in the closed position until a predetermined release torque is applied between the closure and the container neck.

Preferably, the means for defining the closed position produces a detectable "click" effect when the closed position is reached.

The means for defining the closed position and the  
5 retaining means may be embodied together as projections on the container neck and on the closure, the projections engaging as the closed position is reached. At least one of the projections may preferably be profiled to have a circumferential ramp surface over which the other projection  
10 can ride easily as the closure nears the closed position, and a radially inwardly extending abutment surface against which the other projection bears when the closure is to be unscrewed from the closed position.

The skirt portion is preferably deformable temporarily  
15 to allow the projections to ride over one another when the closure is screwed into or unscrewed from the closed position.

The invention according to this aspect is particularly suitable for use with a child-resistant closure as described  
20 in our UK patent application Nos. 9120264.8 and/or 9122097.0. The positively defined closed position indicates to a user that no further tightening of the child-resistant closure is required. The retaining means holds the closure in position until a predetermined amount of torque is  
25 applied between the container neck and the closure, thereby ensuring that the child-resistant feature can operate effectively.

In another closely related aspect, the invention provides an assembly comprising a container neck and a  
30 closure therefor, complementary threads on the container neck and the closure, the closure having a skirt portion an inner surface of which is adapted to seal, in use, against an outer surface of the container neck, the assembly further comprising means for defining an ultimate stop position of  
35 the closure on the container neck beyond which stop position the closure cannot be tightened further.

Such an arrangement prevents a user from overtightening the closure to such an extent that the closure cannot be



removed later without extreme difficulty. The arrangement may also prevent damage such as permanent deformation of co-operating surfaces of the closure and container neck, which might otherwise occur if the closure is considerably  
5 overtightened on the container neck.

The means for defining the ultimate stop position is preferably used in combination with the means for defining the closed position, as described above in accordance with the first aspect of the invention.

10 In one such combination, the ultimate stop position may be defined at substantially the same position as the closed position. With such an arrangement, the closure will always be tightened up to a predetermined closed position.

In an alternative combination, the ultimate stop  
15 position may be defined at a position beyond the closed position. There will thus be defined a range of closure positions to which the closure may be tightened.

The means for defining the ultimate stop position may comprise circumferential stop means for defining a stop  
20 position on the circumference or periphery of the container neck. This may co-operate with a projection on the closure to define an ultimate angular orientation of the closure on the container neck beyond which the closure cannot be rotated. The circumferential stop means may comprise a  
25 projection having a radially outwardly extending abutment surface to abut a corresponding projection on the inner surface of the closure.

Alternatively, the means for defining the ultimate stop position may comprise axial stop means for defining an axial  
30 position beyond which the closure cannot be further tightened. For example, such an axial stop means may comprise a radially flat abutment surface on the container neck, which surface co-operates with a corresponding surface or edge of the closure.

35 Alternatively, the axial stop means may be embodied in the arrangement of the sealing surfaces of the container neck and closure. For example, the sealing surfaces may be tapered, or inclined at an angle, relative to the

longitudinal axis of the container neck and the closure. With such an arrangement, as the closure is tightened beyond the usual sealing position, the sealing surfaces will tend to produce an axial force opposing further tightening of the closure on the container neck. The sealing surfaces may also tend to produce an increasing circumferential frictional force opposing rotation of the closure as the closure is tightened on the container neck.

In a further closely related aspect, the invention provides an assembly comprising a container neck and a closure therefor, complementary threads on the container neck and the closure, the closure having a skirt portion an inner surface of which is adapted to seal, in use, against an outer sealing surface of the container neck, the skirt portion being tapered radially outwardly towards the open end of the closure, the sealing surface of the container neck being tapered radially inwardly towards the open end of the container neck, and the closure being movable from an opened to a closed position by relative rotation through approximately 90° or less.

Preferably, the sealing surfaces are tapered equally so as to be complementary. Preferably the taper is at an angle of between about 1° and about 45°, most preferably between about 1° and about 25°, and in particular about 5°.

In a related aspect, the invention provides an assembly comprising a container neck and a closure therefor, and a tamper evident ring, the ring being initially coupled to the closure by severable connections and being visible between the closure and the container neck to indicate that the closure has not yet been removed by a user, the arrangement being such that, in use, the connections are severed on the occasion that a user first removes the closure, the ring being subsequently movable to a position on the container neck which is clear of the closure when the closure is later replaced, to indicate that the closure has been removed from the container neck at least once.

Such an arrangement can provide a convenient indication of whether the connection between the tamper evident ring

and the closure is intact. If the connection is intact, the ring will be supported between the closure and the container neck. This indicates that the container is unopened. Preferably, a portion of the ring will project below the lower edge of the closure so that the ring is plainly visible. The ring may be made in a contrasting colour to the closure and/or the container.

When the closure is removed, the connections will be severed, and the ring can drop down the neck to a position in which it is clear of, and visibly separated from, the closure when the closure is replaced later. This position of the ring indicates that the closure has been removed at least once from the container, and may indicate to a person purchasing the container that the container has been tampered with.

In a closely related aspect the invention also provides an assembly comprising a container neck and a closure therefor, and a tamper evident ring, the ring being slidable in a longitudinal direction on at least a portion of the container neck and being captive thereon, and the ring being initially coupled to the closure by severable connections which connections are, in use, severed on the first occasion that a user removes the closure from the container neck.

Such an arrangement ensures that the tamper evident ring cannot be removed from the container neck, for example, by a person who has maliciously tampered with the container. The tamper evident ring is thus always present on the container neck to indicate whether or not the closure has previously been opened.

Preferably, when the assembly includes a tamper evident ring, the closure is provided with an upstanding diametric handle. The handle may be in the form of an upstanding flange.

Such a handle has been found to be especially convenient for enabling the closure to be tightened or unscrewed with ease. The handle is especially convenient for use by elderly people who might otherwise have trouble in grasping

the sides of the closure sufficiently strongly to tighten or unscrew the closure. The flange is particularly advantageous in enabling an elderly person to apply with ease a sufficient torque to break the severable connections  
 5 between the tamper evident ring and the closure.

The tamper evident ring may be used in conjunction with a child-resistant closure, such as that described in our UK patent applications nos. 9120264.8 and 9122097.0. The upstanding flange handle would then also provide a  
 10 convenient way for an elderly person to apply a downward pressure on the closure to engage the castellations, as well as enabling the person to apply sufficient torque to release the closure.

In a further closely related aspect, the invention  
 15 provides a container neck and a closure therefor, the container neck having a substantially outwardly facing sealing surface near the open end of the container neck, the sealing surface being adapted to co-operate, in use, with a complementary sealing surface of the closure to form a seal,  
 20 the container neck further comprising a threaded portion for co-operating, in use, with a complementary thread of the closure, the threaded portion of the container neck being further from the open end of the container neck than the sealing surface.

25 Such an arrangement can seal the contents of the container from any contamination such as dirt which may exist on the threaded portions of the container neck and closure.

In a further related aspect, the invention provides a  
 30 container neck adapted to receive a complementary closure, the outer surface of the container neck adjacent the open end having a reduced circumference compared to the base portion of the container neck, a peelable sealing web being sealed over the open end of the container neck, an edge or  
 35 edges of the sealing web projecting radially proud of the reduced circumference portion of the container neck.

Such an arrangement is advantageous in facilitating the peeling of the seal. At least one edge of the seal in

effect overhangs the reduced circumference portion of the container neck to provide a tab by which the seal can be peeled off. Preferably, the entire periphery of the seal overhangs, so that an annular tab is formed around the reduced circumference portion of the container neck.

The reduced circumference portion may be formed substantially as a step, or groove, at the open end of the container neck. The size of the step, or groove, will be sufficient to enable a user to grasp the overhanging portion of the seal so that it can be peeled back.

In one embodiment, the side of the step may be chamfered radially outwardly away from the open end of the container neck.

Although the various aspects described above may be used in embodiments independently of one another, a particularly advantageous arrangement is achieved by combining the aspects together.

Embodiments of the invention will now be described by way of example, with reference to the accompany drawings, in which:-

Fig. 1 is a side view showing a container neck and a closure with a portion of the closure being cutaway; and

Fig. 2 is a similar view to Fig. 1 showing an alternative embodiment.

Fig. 1 shows a container having a container neck 10, and a closure 12 for fitting to the neck 10. The closure 12 is preferably a child-resistant closure incorporating the features disclosed in our UK patent applications Nos. 9120264.8 and 9122097.0. For clarity, the inner and outer closure parts 14 and 16 of the child-resistant closure are shown in Fig. 1, but the remaining detail of the child-resistant closure system is omitted.

The container neck 10 is formed with a base portion 18, a  $\frac{1}{4}$ -turn threaded portion 20, an upper sealing surface 22 and crown portion 24 at the open end of the container neck, having a reduced circumference. Two diametrically opposed, and axially chamfered, radial projections, or protrusions, 25 are formed on the base portion 18. Each protrusion has

a circumferential ramp surface 25a and an inwardly extending radial abutment surface 25b.

5 A peelable foil sealing web 26 is sealed over the open end of neck such that its edge 28 projects radially proud of the crown portion 24. The crown portion 24 is chamfered radially outwardly away from the open end of the neck 10, to form a recess below the edge 28 of the sealing web 26. The projecting edge 28 forms a tab by which the foil can be grasped by a user's fingers, and peeled off.

10 The portion of the closure which is adapted to fit on to the container neck 10 (i.e. the inner closure part 14) is profiled to have an upper skirt portion 30, a  $\frac{1}{4}$ -turn threaded portion 32 and a lower skirt portion 34. Four inwardly projecting axial ribs 36 are provided on the lower skirt portion.

15 The detail of the  $\frac{1}{4}$ -turn threaded portions 20 and 32 of the container neck 10 and closure 12, respectively, and the axial ribs 36 and protrusions 25, are preferably as disclosed in our International application No. 20 PCT/GB91/00850. With this arrangement, the closure 12 is movable between an opened position in which it is released from the neck, and a closed position in which it is firmly attached to the neck, by rotation through about 90°. The threads each have four starts.

25 The detail of the upper skirt portion 30 of the closure 12 and of the sealing surface 22 of the container neck 10, are preferably as disclosed in our UK patent application No. 9114871.8. With this arrangement, the inner surface of the upper skirt portion 30 is adapted to make a seal against the 30 sealing surface 22 of the neck when the closure 12 is tightened on the neck 10. The upper sealing surface 22 is tapered radially inwardly towards the crown portion 24, and the upper skirt portion 30 is tapered radially outwardly towards the open end of the closure 12. The tapers 35 preferably complement each other, and have a taper angle of about 5° relative to the longitudinal axis of the container neck and closure.

In use, when the closure 12 is placed over the container

neck 10, the inner closure part 14 passes over the edge 28 of the sealing web 26 without applying pressure directly to the sealing web 26. This ensures that the sealing web 26 will not be damaged by the application of the closure 12 to the neck 10.

The closure 12 is rotated by hand in a clockwise direction (as viewed from above the container) through an angle of about 90° to screw the closure 12 on to the neck 10. As the closure 12 approaches its closed position, one of the ribs 36 will begin to ride against the ramp surface 25a of each protrusion 25, and the upper skirt portion 30 of the closure 12 will approach sealing contact with the sealing surface 22 of the neck 10. As the closure 12 further approaches the closed position, the lower skirt portion 34 will deform into an oval shape to allow the ribs 36 to ride easily over the ramp surfaces 25a of the protrusions 25. As the closure 12 approaches the closed position, the user will be alerted to this by a mild increase in the torque required to rotate the closure as the ribs 36 ride over the protrusions 25.

When the closure reaches its closed position, the ribs 36 will pass the end of the ramp surfaces 25a, and will snap radially inwardly as the lower skirt portion 34 resumes its normal circular shape. In so doing, a "click" sound will be emitted, and a "click" effect will be felt through the material of the closure. This indicates to the user that the closed position has been reached, and that no further tightening of the closure is required.

In the closed position the upper skirt portion 30 of the closure 12 makes sealing contact with the sealing surface 22 of the neck, to form a reliable seal.

The engagement between the sealing surface 22 and the upper skirt portion 30 also serves to prevent the closure 12 from being overtightened substantially beyond the closed position. As the closure is tightened, the tapered sealing surfaces will bear against each other more strongly, producing a face which tends to oppose further axial movement of the closure.

The protrusion 25 also serves as a retaining means to hold the closure 12 in the closed position until a predetermined torque is applied between the inner closure part 14 and the neck 10. If the applied releasing torque is insufficient the ribs 36 will abut the radial abutment surfaces 25b of the protrusions 25, which thereby prevent the closure 12 from being unscrewed. When the applied torque is sufficient, the lower skirt portion 34 of the closure 12 will deform to an oval shape to allow the ribs 36 to pass over the protrusions. With reference to the detail of the child-resistant closure as described in our UK patent applications 9120264.8 and 9122097.0, this ensures that the child-resistant feature will operate effectively and reliably.

The container neck 10 is also provided with a tamper-evident ring 44. The ring 44 is slidable on the base portion of the neck 10, but is held captive on the base portion by abutments (not shown). The ring 44 will initially be coupled to the closure by severable connections (shown diagrammatically at 50), which are severed on the first occasion that the closure is removed from the container neck. The detail of the ring is preferably as described hereinbefore and/as that disclosed in our UK patent applications Nos. 9120264.8 and 9122097.0.

The closure is preferably provided with an upstanding diametric flange handle 46. The detail of this is preferably as that disclosed in our UK patent applications 9120264.8 and 9122097.0, and/or as that disclosed in our International application PCT/GB90/00850. Such a handle has been found to be especially convenient for enabling the closure to be tightened or unscrewed with ease. The handle is especially convenient for use by elderly people who might otherwise have trouble in grasping the sides of the closure sufficiently strongly to tighten or unscrew the closure.

Fig. 2 illustrates a modified embodiment very similar to that of Fig. 1. The difference is that the assembly in Fig. 2 also includes a stop means for defining an ultimate stop position of the closure 12 on the neck 10, beyond which



position the closure 12 cannot be tightened further, to prevent the closure from being overtightened. In this exemplary embodiment the stop means are provided in the form of circumferential stop means for preventing rotation of the cap beyond a ultimate circumferential position.

The circumferential stop means co-operate with the ribs 36 of the closure 12 to define an angular position beyond which the closure 12 cannot be tightened further. The stop means are in the form of stop protrusions 48 arranged circumferentially beyond the protrusions 25, in a clockwise direction (as viewed from above the container). Each protrusion 48 has a radial abutment surface 48a against which a rib 36 will abut as the closure 12 reaches the ultimate stop position. In the arrangement shown in Fig. 2, each stop protrusion 48 is spaced by a short distance from the corresponding protrusion 25, so that the ultimate stop position is defined as being substantially the same as closed position, and the relevant rib 36 will engage between the adjacent pair of protrusions 25 and 48. However, in an alternative embodiment, the stop protrusions 48 may be spaced further from the protrusions 25 so that a range of closure positions is defined.

Alternatively, the stop means could be provided in the form of axial stop means to prevent further axial movement of the closure beyond an ultimate axial stop position. For example the stop means could be formed partly by an upwardly facing radially flat surface 40 adjacent the base portion of the neck 10. This surface 40 would abut the lower edge, or rim, of the closure if the closure were tightened substantially beyond the normal closed position.

The axial stop means could also partly be formed by the engagement between the upper skirt portion 30 of the closure 12 and the sealing surface 22 of the neck 10. As the closure is tightened beyond the normal closed position, these tapered sealing surfaces will bear against each other more strongly, producing a force which tends to oppose further axial movement of the closure 12.

Although in the embodiment illustrated in Fig.1 the

inner closure part 14 projects below the edge of the outer closure part 16, it will be appreciated that in other embodiments the outer closure part may be extended downwardly so as to substantially conceal the edge of the  
5 inner closure part. This would avoid the possibility that a child might overcome the child-resistant feature of the closure by turning the exposed portion of the inner closure part 14.

It will of course be understood that the present  
10 invention has been described above purely by way of example, and modifications of detail can be made within the scope of the invention.

CLAIMS

1. An assembly comprising a container neck and a closure therefor, complementary threads on said container neck and  
5 said closure, means for positively defining a closed position of said closure on said container neck, retaining means for holding said closure, in use, in said closed position, said closure being movable between said closed position and an opened position by relative rotation through  
10 approximately 90 degrees or less, and said assembly further comprising means for preventing said closure from being overtightened substantially beyond said closed position.
2. An assembly according to claim 1, wherein said means  
15 for defining said closed position produces a detectable "click" effect when the closed position is reached.
3. An assembly according to claim 1 or 2, wherein said retaining means retains said closure, in use, in said closed  
20 position until a predetermined release torque is applied between said closure and said container neck.
4. An assembly according to claim 1, 2 or 3, wherein said  
25 closure is a relevant child-resistant closure.
5. An assembly according to claim 1, 2, 3 or 4, wherein  
said means for defining said closed position and said retaining means together comprise one or more projections on  
said container neck and on said closure, said projections  
30 engaging as the closed position is reached.
6. An assembly according to claim 5, wherein at least one  
of said projections is profiled to have a circumferential  
ramp surface over which said other projection can ride  
35 easily as said closure means nears said closed position, and an abutment surface against which said other projection bears when said closure is to be unscrewed from said closed position.

7. An assembly according to claim 5 or 6, wherein said container neck and said closure comprise complementary sealing surfaces for forming a seal when said closure is in  
5 said closed position on said container neck.

8. An assembly according to claim 7, wherein said complementary sealing surfaces constitute said means for preventing said closure from being overtightened  
10 substantially beyond said closed position.

9. An assembly according to any of claims 1 to 8, wherein said means for preventing said closure from being overtightened substantially beyond said closed position  
15 comprise one or more stop projections on said container neck which engage one or more projections on said closure.

10. An assembly comprising a container neck and a closure therefor, complementary threads on said container neck and  
20 said closure, means for positively defining a closed position of said closure on said container neck, said closure having a skirt portion an inner surface of which is adapted to seal, in use, against an outer surface of said container neck when said closure is screwed into said closed  
25 position, the said surfaces forming the seal co-operating to oppose overtightening of said closure substantially beyond the closed position.

11. An assembly according to claim 10, wherein said assembly  
30 also comprises means for retaining said closure in said closed position until a predetermined release torque is applied between said closure and said container neck.

12. An assembly according to claim 10 or 11, wherein said  
35 means defining said closed position and said retaining means together comprise one or more projections on said container neck and on said closure, said projections engaging as said closed position is reached.

13. An assembly comprising a container neck and a closure therefor, complementary threads on said container neck and said closure, means for positively defining a closed position of said closure on said container neck, complementary sealing surfaces on said container neck and said closure for forming a seal when said closure is screwed into said closed position, said sealing surfaces being inclined relative to said longitudinal axis of said container neck whereby said sealing surfaces co-operate to oppose overtightening of said closure substantially beyond said closed position.

14. An assembly comprising a container neck and a closure therefor, complementary threads on said container neck and said closure, said closure having a skirt portion an inner surface of which is adapted to seal, in use, against an outer surface of said container neck, said assembly further comprising means for positively defining a closed position of said closure on said container neck at which position said skirt portion is adequately seated on said container neck to obtain a seal, whereby, overtightening of said closure on said container neck can be avoided.

15. An assembly comprising a container neck and a closure therefor, complementary threads on said container neck and said closure, said closure having a skirt portion an inner surface of which is adapted to seal, in use, against an outer surface of said container neck, said assembly further comprising means for defining an ultimate stop position of said closure on said container neck beyond which stop position said closure cannot be tightened further.

16. An assembly according to claim 15, wherein said closure is movable from a fully open to a fully closed position by relative rotation through 360° or less.

17. An assembly according to claim 16, wherein said relative

rotation is 180° or less.

18. An assembly according to claim 17 wherein said relative rotation is 90° or less.

5

19. An assembly comprising a container neck and a closure therefor, and a tamper evident ring, said ring being initially coupled to said closure by severable connections and being retained between said closure and said container neck to indicate that said closure has not yet been removed

5 by a user, said closure being removable by rotation through

about 360° or less, the arrangement being such that, in use, said connections are severed on the occasion that a user first removes said closure, said ring being subsequently movable to a position on said container neck which is clear

10 of said closure when said closure is later replaced, to indicate that said closure have been removed from said container neck at least once.

20. An assembly according to claim 19, wherein said closure  
15 is removable by relative rotation through about 90° or less.

21. An assembly substantially as hereinbefore described with reference to Fig. 1 or to Fig. 2 or to Fig. 3 of the accompanying drawings.

**Patents Act 1977**

-20-

**Examiner's report to the Comptroller under  
Section 17 (The Search Report)**

Application number

GB 9124872.4

**Relevant Technical fields**

(i) UK Cl (Edition K ) B8T (THT TBM TCC TTC THSA)

(ii) Int Cl (Edition 5 ) B65D 41/04 41/34

**Databases (see over)**

(i) UK Patent Office

(iii)

**Search Examiner**

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30 DECEMBER 1992

Documents considered relevant following a search in respect of claims 1-18 AND 21

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2229170 A (ULTIMOS) see Figure 1	1, 5, 9, 14, 15, 16
X	GB 2148859 A (L'OREAL) see Figures 2 and 6	1, 2, 3, 5, 6, 7, 9, 14, 15, 16
X	EP 0475805 A1 (CHEVASSUS) see abstract	1, 5, 7, 9, 14, 15, 16, 17
X E	WO 91/18799 A3 (BEESON) 12 December 1991 entire document relevant	1-3, 5, 6, 7, 9, 11, 12, 14-18
X	US 4662530 (GONCALVES) see Figures 1 and 2	1, 2, 3, 5, 6, 7, 9, 14, 15, 16
X	US 4373641 (J N BANICH) see Figures 1 and 4 and page 3 lines 6-61	1, 5, 7, 8, 9, 10, 11, 13, 14, 15

Category	Identity of document and relevant passages	Relevant to claim(s)

### Categories of documents

**X:** Document indicating lack of novelty or of inventive step.

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**A:** Document indicating technological background and/or state of the art.

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